



## **ATTACHMENT A Remarks**

Claims 1-16 and 18-41 stand pending in the present application. By this Amendment, Applicant has amended claims 1, 3, 4, 10-16, 19-40 and added new claim 41. Applicant submits that the present application is in condition for allowance based on the discussion which follows.

The Abstract of the Disclosure was objected to by the Examiner stating that this application did not contain an abstract as required by 37 C.F.R. § 1.72(b), so that the Examiner then required an abstract on a separate page. However, this requirement in a national stage § 371 application is "improper" (see MPEP § 1893.03(e)) since the PCT published application contained an abstract on a separate page. However, in order for the present abstract to be in a more conventional U.S. abstract form, the prior abstract has been amended by deleting the reference numbers.

Claims 1, 3, 4, 19 and 22 were objected to for including informalities. By this Amendment, Applicant has amended the aforementioned claims thereby obviating the objection.

Claims 23, 27, 30, 34 and 37 were objected to under 37 C.F.R. § 1.75(c) as being in improper dependent form. By this Amendment, Applicant has amended claims 23, 27, 30, 34 and 37 to now be directed to different optical devices which include various grating structures using the present method. Each claim is directed to a different optical device such as an optical filter (claim 23), an optical free space coupler (claim 27), an optical sensor (claim 30), an optical fiber (claim 33), and an optical

compensator (claim 37). Accordingly, as amended, Applicant respectfully submits that claims 23, 27, 30, 34 and 37 are now in proper dependent form.

Claim 16 was rejected under 35 U.S.C. § 112, second paragraph, for referring to a "higher order grating" where the Examiner noted that "higher" is a relative term which did not include a comparative value to which "higher" was referred. By this Amendment, Applicant has amended claim 16 to provide context to which the higher grating refers thereby obviating the rejection to claim 16.

Claims 1-22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,548,225 to Hammon in view of U.S. Patent No. 5,367,588 to Hill. The Examiner alleges that Figure 4 of first Byron and then later, Hammon, disclosure the present method except for dividing the input coherent beam into at least three coherent beams. The Examiner makes up the deficiency of Byron/Hammon by alleging that Hill teaches the fabrication of optical waveguide devices. The Examiner then alleges that it would have been obvious at the time of the invention to use the phasemask with the one dimensional surface-relief structure of Hill for the apparatus for writing gratings of Hammon.

As an initial point, although the Examiner first alleges that Byron discloses various aspects in Figure 4 of the present invention before referring back to Hammon, since Byron does not include a Figure 4, Applicant presumes that the Examiner intended to refer to Hammon and not Byron in the paragraph bridging pages 3 and 4 of the Office Action.

The present method and apparatus are not obvious from Hammon in view of Hill. Hammon discloses a method of writing a simple grating. However, Hammon fails to

teach or suggest writing superimposed gratings. Moreover, Hammon fails to suggest that writing superimposed gratings may be desirable. Furthermore, Hammon fails to teach or suggest that superimposing gratings of different orders with respect to a single wavelength would be desirable. Therefore, Hammon fails to anticipate the claimed method of producing superimposed grating of different orders.

Hill fails to make up the deficiencies of Hammon. Although Hill discloses a method of writing a grating using a phasemask. The phasemask is specifically constructed to produce a +1 and -1 order beam and to suppress the 0 order beam. As the Examiner correctly points out, Hill states that the intensity of the 0 order beam is minimized to less than 5%. Therefore, although the phasemask divides the input beam into three coherent beams, Hill clearly teaches that it is undesirable to have a 0 order beam and thus, the 0 order beam should be suppressed. Thus, one of ordinary skill in the art would not apply the teaching of Hill which teaches to minimize the 0 order beam in a method which specifically requires three coherent beams. Therefore, the present method which utilizes three coherent beams in a method to form a superimposed grating of different orders is not obvious from Hammon in view of Hill.

Furthermore, Hill does not disclose any active adjustment of the beams as required by claim 1. Therefore, *arguendo*, combined teaching of Hammon and Hill does not result in the claims invention. The suppression of the 0 order beam is achieved by the structure of the phasemask itself and the presence of the 0 order beam in an amount of less than 5% is due to imperfections of the grating structure. Thus if one of ordinary skill in the art were to combine the individual teachings of Hill with Hammon,

one would not produce a superimposed grating of different orders with respect to a certain wavelength using three coherent beams as claimed.

Moreover, there fails to be any teaching or suggestion which would motivate one of ordinary skill in the art to combine Hammon with Hill. Although it is known that gratings could be superimposed, the Office Action fails to include any motivation or suggestion as to why it would be desirable to superimpose gratings of different orders with respect to a certain wavelength.

Prior to the present invention, there was no known benefit of superimposed gratings of different orders with respect to a certain wavelength. In fact as illustrated by Hill, the prior art actually taught away from superimposing gratings of different orders, by taking all possible steps to avoid the superposition of gratings of different orders. Further, the present method is distinguished from prior methods which write the superimposed gratings separately rather than simultaneously. In the writing of superimposed gratings non-simultaneously, one problem occurs when a fiber only has limited photosensitivity. In the present invention, because the gratings are written simultaneously, this is not a problem. However, simultaneously writing can only be achieved because the gratings are of different order with respect to the same wavelength but, as discussed above, there fails to have been any recognition in any of the prior art that such a composite grating would be useful or desirable. Without this understanding or realization, there fails to be any motivation to combine documents in any way as alleged by the Examiner. Accordingly, absent the present disclosure, there fails to be any motivation in the respective cited art to suggest their combination with one another.

Based on the foregoing, Applicant respectfully submits that claims 1-22 are not obvious under 35 U.S.C. § 103(a) by Hammon in view of Hill.

Claims 23-40 were held to not be distinguishable from the method claims of claims 1-22. As noted above, claims 23-40 have been amended to more clearly recite the various claimed optical devices. Applicant respectfully submits that claims 23-40 are not obvious from the prior art as these claims are directed to novel optic devices which are manufactured using the present non-obvious method. Accordingly, using the present method, the claimed optical devices are manufactured which in no way are suggested by the prior art of record as discussed above with regard to the rejection of claims 1-22.

Based on the foregoing, Applicant respectfully submits that the present application is in condition for allowance.

**END REMARKS**